Fall 9-1-2005

RAD 131T.01: Radiographic Physics

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Univeristy of Montana - Missoula

THE UNIVERSITY OF MONTANA – MISSOULA
COLLEGE OF TECHNOLOGY
DEPARTMENT OF RADIOLOGY TECHNOLOGY

COURSE SYLLABUS

COURSE NUMBER AND TITLE: RAD131T Radiographic Physics

DATE REVISED: Autumn 2004

SEMESTER CREDITS: Physics 4

PREREQUISITES: MAT 100T Algebra

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RELATIONSHIP TO PROGRAM: Students will gain a clear understanding of how radiological physics directly relates to the production of x-rays and how it is utilized in the day to day operations of an imaging department.

COURSE DESCRIPTION: Content of the class is designed to establish students with a knowledge base in factors that govern and influence the production and recording of radiologic images.

STUDENT PERFORMANCE OUTCOMES:
Upon completion of this course, the student will be able to:

1. Analyze the relationships of factors that control and affect image density.
2. Analyze the relationships of factors that control and affect radiographic contrast.
3. Differentiate between umbra and focal spot blur.
4. Define distortion.
5. Differentiate between shape and size distortion.
6. Perform calculations to determine to determine image magnification and percent magnification.
7. Summarize the relationships of factors affecting distortion.
8. Formulate a plan of action to decrease image distortion.
9. Describe the operational and applications for different types of beam-limiting devices
10. Explain beam filtration.

11. Describe the change in the half value layer (HVL) when additional filtration is added to the beam
12. Summarize the relationships of factors affecting scattered and secondary radiation.
13. Compare types of grids.
14. Articulate the advantages and disadvantages of grid use.
15. Describe grid maintenance
16. Select the most appropriate grid for a given clinical situation.
17. Define grid cut-off.
18. Summarize the factors influencing grid cut-off.
19. Evaluate grid artifacts
20. Formulate a set of rules for grid use to prevent grid cut-off and artifacts.
21. Explain the use of standardized radiographic technique charts.
22. Explain exposure factor considerations involved in technique selection.
23. Compare fixed kilovolt peak(kVp) to variable kVp system
24. Calculate the photographic effect when exposure factors are given
25. Describe the function of each component of radiographic film.
26. Explain latent image formation.
27. Discuss photostimulable phosphor plates as image receptors
28. Discuss how an image is retrieved from a photostimulable phosphor.
29. Describe the features of the characteristic curve and explain its purpose.
30. Compare the characteristic curve for differing types of image receptors, both film and photostimulable phosphor plates.
31. Describe various types of image receptor holders.
32. describe the function of each component of an intensifying screen
33. Explain the classifications of intensifying screen and the applications of each.
34. Define potential difference, current and resistance.
35. Describe the characteristics of direct and alternating currents
36. Describe electrical protective devices
37. Identify the general components and function of the primary, secondary and filament circuits
38. Identify the function of solid-state rectification
39. Compare single phase, three phase, high frequency and falling load generator in terms of radiation production and efficiency.
40. Discuss permanent installation of radiographic equipment in terms of purpose, components, types and application.
41. Demonstrate operation of various types of permanently installed radiographic equipment.
42. Discuss mobile units in terms of purpose, components, types and applications.
43. Discuss the application of automatic exposure control (AEC) devices.
44. Explain image-intensified fluoroscopy.
45. Discuss gain and conversion factors as related to image intensification.
46. Discuss fluoroscopic image formation in terms of image size and brightness.
47. Indicate the purpose, construction and application of video camera tubes, TV monitors and video recorders.
48. Identify fluoroscopic recording equipment.
49. Explain the purpose, principles and application of conventional tomography.
50. Discuss the purpose and procedure of radiographic magnification.

51. Discuss electronic imaging equipment used in radiography and fluoroscopy.
52. Discuss Flat panel detectors used in digital electronic x-ray equipment.
53. Differentiate between quality improvement/management, quality assurance and quality control.
54. List the benefits of a quality management program to the patient and to the department.
55. List elements of a quality management program and discuss how each is related to the quality management program.
56. Discuss the proper test equipment/procedures for evaluating the operation of the x-ray generator.
57. Evaluate the performance of the x-ray generator.

STUDENT PERFORMANCE ASSESSMENT METHODS AND GRADING PROCEDURES:

Grading scale:
100-90 A
89-80 B
79-70 C
69-60 D

Total grade will be determined by total points received on homework, tests, final paper and final exam.

Tests:	40%
Paper:	30%
Final Exam:	30%
	100%

Instructions for Semester Paper: Choose a topic or several related topics from the list of student performance outcomes. Give me your topic in writing no later than Thursday, September 30, 2003. Research and expand upon the subject in a type written paper, double spaced and 3 to 4 pages in length. Use 12pt font and one inch top and bottom margins. Students will present these papers to the class during class on May 5th and 6th. The purpose of the presentation is to instruct fellow students, provide opportunity for discussion and to gain confidence in presenting ideas and information. Please send me an electronic copy of your paper prior to the day you are presenting and give me a hardcopy directly following your presentation.

Papers will be graded for content, interest, attention to detail, correct grammar and punctuation. Presentations will not be graded but must be done to receive full credit for your paper.

Note: Students must pass this course with a "B" (80%) in order to continue with the Radiology Technology Program the next semester.

ATTENDANCE POLICY: All students are expected to come to class each day, on time and prepared by having read the required chapters and completed the assigned worksheets. Class participation is expected and may impact grades that are borderline.

REQUIRED TEXT: *Radiologic Science for Technologists;* 8th Edition, Stewart C. Bushong.

Radiologic Science, Workbook and Laboratory Manual; 8th Edition, Stewart C. Bushong.

DATE	READING ASSIGNMENT	ONLINE COURSE
Aug 30-Sep3	Introduction Chapter 1	 Module 1 Lessons 1-3
Sep 6-10	Chapter 2	Module 1 Lessons 1-3
Sep 13-17	Chapter 3	Module 1 Lessons 1-3
Sep 20-24 Sep 23	Chapter 4 Test 1	Module 2 Lessons 1-3 Test
Sep 27-Oct 1 Sep 30	Chapter 5 Paper topic due	Module 3 Lessons 1-3
Oct 4-8	Chapter 6	Module 4 Lessons 1-3 Module 5 Lesson 1
Oct 11-15 Oct 14	Chapter 7 review Test 2	Module 5 Lessons 2&3 Test
Oct 18-22	Chapter 8	Module 6 Lessons 1-3
Oct 25-29	Chapter 9	Module 7 Lessons 1-3
Nov 1-5 Nov 8-12	Chapter 10 Nov 2 & 11 Holiday	Module 8 Lessons 1-3
Nov 15-19 Nov 23	Chapter 11& 12 Nov 25 holiday	Module 8 Lessons 1-3 Test
Nov 29-Dec 3	Present papers review	19-1, 19-2, 19-3, and 19-4 20-1, 20-2, 20-3, 20-4, and 20-5
Dec 6-10	Present papers review	21-1, 21-2, and 21-3 Test
Dec 13-17	Finals	22-1 25-1,15-2 and 25-3
	Present papers Finish papers/review	Presentation of Papers Review for final

Revises7-7-04